

Filter tips

JUST AS CIGARETTES COME WITH A HEALTH WARNING, PERHAPS SOME AIR FILTERS SHOULD COME WITH A 'WEALTH WARNING' BECAUSE SIMPLY BY CHANGING YOUR FILTER TO A DIFFERENT TYPE OF TECHNOLOGY, YOU CAN REDUCE YOUR ENERGY COSTS WHILST STILL MAINTAINING THE LEVEL OF FILTRATION AND AIRFLOW YOU NEED.

The last issue of Know+How looked at ways to reduce the amount of energy used by fans and pumps; from the simplest solution of changing the ratio of the belt and pulley that drives a particular fan, to the more complex method of fitting inverters to enable slower running speeds. The article also mentioned the ultimate solution, of doing all the above plus fitting a new, highly efficient filter.

So how does a change of filter help reduce energy bills?

Whether you are using an air filter as part of your process (in a cooling, warming or venting system, for example) or to maintain an environment (as part of your air conditioning system) you face the same problem of maintaining an acceptable balance of filtration efficiency and back pressure. The higher the filtration efficiency, the higher the initial back pressure, and the sooner the filter becomes clogged – leading to a further increase in back pressure. In both cases, reduced air flow leads to higher energy use, as the fan has to work harder or run faster to push the air through the filter.

Developments in filter technology over the past few years have largely been aimed at achieving acceptable filtration levels without increasing back pressure or shortening filter life through faster clogging, and without increasing energy consumption through

the need for a more powerful or faster fan. One way to do this is through an increased filter surface area – providing exceptionally low pressure drop – combined with high filtration efficiency and a high dust-holding capacity. This technology is now commercially available in the shape of the Vokes-Air Synsafe Revo filter.

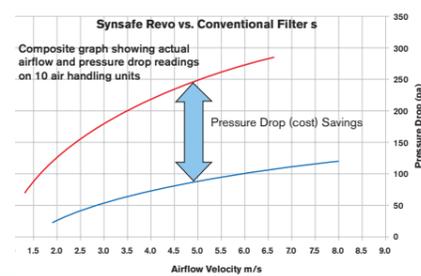
The Synsafe Revo combines two advances in filtering technology.

Firstly, it utilises not one but four progressive filter layers. This not only means a greater dust-holding capacity but also ensures the filters have a longer life before the build-up of filtered particles increases reduces efficiency to unacceptable levels. The four layers comprise:

1. a pre-filter with a coarse structure to remove the largest particles
2. a primary fine filter to remove smaller particles
3. a secondary fine filter incorporating Nanofyne Technology™
4. a self-cleaning outer layer which also provides rigidity to the media.

Secondly, the filters in the Synsafe Revo are made from nano fibres, using unique Nanofyne Technology. These fibres have a diameter of less than 1µm (compared with 3µm for fibres in conventional filters) which means they offer a greater fibre surface area for trapping dust, together with less density

to create back pressure. The result is higher filtration efficiency and lower pressure drop for longer, which means the fan operates at lower speed and consequently uses less energy. If the fan is belt driven, then this will provide the opportunity for a change of belt and pulley ratio to reduce the fan speed, or an inverter to provide speed control – both areas in which ERIKS can provide expert advice and assistance.



Such advanced technology, although expensive has a return on investment measured in months. With reduced labour costs as a result of fewer filter changes, and reduced energy costs through slower running of the fan, there is an overall cost saving of approximately £120 per filter per annum. As outlined in the previous issue, simply reducing the speed of a 7.5kW fan motor by 20% typically reduces energy consumption by around 40%. This also has the beneficial effect of reducing CO₂ emissions by 4.5 tonnes.

Further evidence of cost savings and CO₂ reduction can be seen from the example below based on a 12 filter Air Handling Unit:

	Standard Filters	Synsafe Revo
Capital cost	£220	£660
Labour cost Based on £5/filter change	£180	£60
Energy cost Based on 11p/kWh and 6,570 running hours	£5000	£3500
OVERALL COST SAVING		£1200
CO₂ REDUCTION		6000kg/annum



The Synsafe Revo filter has already been used in a number of applications with impressive results. Installed in an air-conditioning system in a prestigious London museum for a six week comparative trial, the Revo filter achieved an average pressure drop of just 68 Pascals, compared with 182 Pascals for the existing pleated panel and fibreglass bag filter. Also taking into account the reduced interventions required and the lower stock value and storage space (the existing system incorporated a pre-filter which required changing every quarter) **the annual cost savings were calculated to be £2,200 for one unit alone, extrapolated to £130,000 across the whole site. At the same time, installing Revo filters across the whole site would result in a reduction in carbon emissions of 500 tons per annum.**

In a more critical application, in a clean room environment for the NHS, the Synsafe Revo filter proved to be a cost-effective solution to increasing air volumes and achieving balance.

There was no scope for increasing the air volume by increasing fan speed, as the existing fan and motor were operating at their maximum capacity, and removing a stage from the filtration system (comprising panel pre-filters, glass fibre secondary filters, rigid filters and HEPA filters) would have compromised the clean room environment. So the only option was to install an air filter with a significantly lower average pressure drop than standard filters: such as the Synsafe Revo.

With the new filter installed, air volumes increased by 20%, and Hertz readings reduced from 50Hz to 46.3Hz. At the same time, pressure drop was reduced by 50%. Consequently, supply diffusers and return air grilles could be adjusted to provide the required air distribution and clean room balance, and in the longer term energy costs and filter replacement costs were cut.

The Vokes-Air Synsafe Revo maintains its sustainable credentials to the end, as it can be recycled or incinerated without emitting any poisonous gasses. So from the moment it's commissioned until the end of its life, a Synsafe Revo filter helps you breath more easily.